

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claim 3 and 12 are requested to be cancelled.

Claims 5 and 8 are rewritten in independent form and are also being amended.

Claims 1, 10, and 29 are currently being amended.

Claims 44-75 are being added.

After amending the claims as set forth above, claims 1, 2, 4-11, and 13-75 are now pending in this application of which claims 1, 5, 8, 10, 19, 29, 37, 44, and 59 are independent.

Examiner Interview

Two interviews were conducted between Applicants' representative Marcus Burch and examiner Mehrdad Dastouri. The rejections of the pending claims were discussed. Further, examiner Dastouri cited additional patents in support of his position including U.S. Patent No. 6,529,622 to Pourjavid, U.S. Pat. No. 6,154,561 to Pratt et al., and U.S. Pat. No. 5,617,461 to Schreiner. Agreement was reached that there was allowable subject matter described in the application, but no agreement was reached with respect to the claims in their form after Applicants' response to the Office Action of June 5, 2003. Also, potential new claims were discussed where it was indicated that the potential new claims were not taught or suggested by the prior art of record but that may be taught or suggested by references found in a subsequent search.

Claim rejections – 35 U.S.C. § 102

On pages 2-5 of the Office Action, Claims 1-3, 5, 8-12, 14, 17-21, 23, 26-31, and 36 were rejected as being anticipated by Granfors et al. (U.S. 5,657,400).

A. Claims 1-2, and 9

Claim 1 was rejected on page 3 of the Office Action. Claim 1 (as amended) recites “wherein the at least a portion of the array of pixel values [which are part of the gradient on which the correction value for the defective pixel is based] comprises a matrix, and includes the defective pixel as a center matrix element and each surrounding neighboring pixel of the defective pixel as additional matrix elements.” Granfors et al. does not teach a gradient on which the correction value for the defective pixel is based comprises surrounding neighboring pixels of the defective pixel as remaining matrix elements. Rather, Granfors et al. teaches that a defective pixel “would be assigned one of the following pixel values or combinations of pixel values, based on the designations shown in FIG. 3: $(E+W)/2$; $(N+S)/2$; $(NW+SE)/2$; $(NE+SW)/2$; N; S; E; W; NE; NW; SE; SW.” Col. 4, lines 38-46. Granfors et al. teaches at most using two neighboring pixels and not “each surrounding neighboring pixel of the defective pixel as additional matrix elements.” Thus, Claim 1, as amended, is believed to overcome the rejection of Claim 1 as anticipated by Granfors et al.

B. Claim 5

Claim 5 depended from Claim 1 and was rejected on page 3 of the Office Action. Claim 5 has been rewritten in independent form. Claim 5 recites “wherein step (b) of providing a correction value includes at least one of a linear interpolation and a weighted average of pixel values corresponding to the highest local gradient matrix elements.” Granfors et al. does not teach a linear interpolation or a weighted average of pixel values corresponding to the highest local gradient matrix elements. Rather, as quoted in the previous section, Granfors et al. teaches that two values are selected to be used to provide a correction value based on their location with respect to the defective pixel. Col. 4, lines 38-46. Selecting a pixel value to be used in providing a correction value based on whether it is a highest local gradient matrix element is not the same as selecting a pixel based only on its location with respect to the defective pixel, because choosing a pixel based on its gradient value is a more sophisticated process that selects values based on their likelihood to provide useful information (in as much as a gradient provides this information) and is adaptive to a particular image whereas the method recited in Granfors et al. only teaches trying a pair of

values until a pair that works is found, the order in which the pairs of pixel values are tried being fixed with no regard to the pixel values of the particular image. The difference in image quality between one conventional method and the more sophisticated method recited in Claim 5 can be seen in Figures 8 and 9 of the present application. See page 1 lines 23-26 and page 9, lines 25-28. Withdrawal of the rejection of Claim 5 as anticipated by Granfors et al. is respectfully requested.

C. Claim 8

Claim 8 depended from Claim 1 as was rejected on page 4 of the Office Action. Claim 8 has been rewritten in independent form. Claim 8 recites “replacing temporarily the defective pixel with a linear interpolation of a surrounding neighboring pixels of the defective pixel before the determining step (a); and replacing the defective pixel with the correction value after the providing step (b).” Granfors et al. does not teach first temporarily replacing the defective pixel with a linear interpolation of a surrounding neighboring pixels, determining a local gradient, and then replacing the defective pixel with the correction value. Rather, Granfors et al. teaches identifying a defective pixel, and then permanently replacing that defective pixel with an average of two neighboring pixel values. Col. 4, lines 38-46. Since Granfors et al. does not teach every element of Claim 8, withdrawal of the rejection of Claim 8 is respectfully requested.

D. Claims 10, 11, 14, 17, and 18

Claim 10 is an independent claim and was rejected on page 4 of the Office Action. Claim 10 was rejected for reasons analogous to Claim 1. Claim 10 has been amended similarly to Claim 1 and is believed to overcome the rejection over Granfors et al. for reasons similar to Claim 1. Claims 11, 14, 17, and 18 depend from Claim 10 and are believed to overcome the rejection over Granfors et al. for at least the same reasons as Claim 10.

E. Claim 19-21, 23, and 26-28

Claim 19 is an independent claim and was rejected on page 4 of the Office Action. Claim 19 recites a “means for determining a local gradient” and is interpreted under 35 U.S.C. § 112, sixth paragraph. The specific structures described in the specification of the

present application are not the same as or obvious variations of the process described at Col. 4, lines 38-46 of Granfors et al. As one example, Granfors et al. does not show a processor 20 configured to perform step 46 of Fig. 3. Since Granfors et al. does not teach every element of Claim 19, withdrawal of the rejection of Claim 19 is respectfully requested. Claims 20, 21, 23, and 26-28 depend from Claim 19 and withdrawal of the rejection of those claims is also respectfully requested.

F. Claims 29-31, and 36

Claim 29 is an independent claim and was rejected on page 4 of the Office Action. Claim 29 was rejected for reasons analogous to Claim 1. Claim 29 has been amended similarly to Claim 1 and is believed to overcome the rejection over Granfors et al. for reasons similar to Claim 1. Claims 30, 31, and 36 depend from Claim 29 and are believed to overcome the rejection over Granfors et al. for at least the same reasons as Claim 29.

Claim Rejections – 35 U.S.C. § 103

A. Rejection of Claims 4, 13, 22, 32, and 37-43 over Granfors

On pages 5-7 of the Office Action, Claims 4, 13, 22, 32, and 37-43 were rejected under 35 U.S.C. § 103(a) as unpatentable over Granfors et al. (U.S. 5,657,400).

Claim 4, 13, 22, and 32

On page 4 of the Office Action, Claim 4 was rejected as obvious over Granfors et al., and Claims 13, 22, and 32 were rejected for reasons analogous to Claim 4. Claim 4 depends from Claim 1, Claim 13 depends from Claim 10, Claim 22 depends from Claim 19, and Claim 32 depends from Claim 29. As discussed above with respect to the § 102 rejections, Granfors et al. fails to teach a limitation of each of these claims. Further, the limitation not taught by Granfors et al. is not an obvious variation of the teachings of Granfors et al.

Specifically, with respect to Claims 4, 13, and 32, “wherein the at least a portion of the array of pixel values [which are part of the gradient on which the correction value for the

defective pixel is based] comprises a matrix, and includes the defective pixel as a center matrix element and each surrounding neighboring pixel of the defective pixel as additional matrix elements” is not an obvious variation of the location-based linear interpretation method taught by Granfors et al. at Col. 4, lines 38-46.

Also, with respect to Claim 22, the structures recited in the specification of the present application corresponding to “means for determining a local gradient” are not an obvious variation of the location-based linear interpretation method taught by Granfors et al. at Col. 4, lines 38-46.

Thus, withdrawal of the rejections of Claims 4, 13, 22, and 32 over Granfors et al. is respectfully requested.

Claims 37-43

Claim 37 was rejected on pages 6 and 7 of the Office Action. Claim 37 recites “analyzing global characteristics of pixels in proximity to the defective pixel; and correcting the defective pixel based on the global characteristics.” With respect to Claim 37, the examiner appears to argue that 1) Granfors et al. teaches that a defective pixel value should be corrected, 2) filters such as 5 x 5 and 7 x 7 filters which take into account global characteristics are well known in the art, 3) that the well known filters of point 2 are known to provide better results, 4) that one of ordinary skill in the art would have been motivated to use the filters of point 2 to achieve better results for the corrected value, and 5) Granfors et al. as modified in view of point 2 and motivated by point 4 suggests the invention claimed in Claims 37-43.

While there may be disagreement on other points, the primary point of disagreement between Applicants’ representative and the examiner is regarding point 4. The proposed motivation cited in point 4 is not stated in any of the references and appears to be contradicted by the disclosure of the patents relied on by the examiner. Specifically, Granfors et al., at Col. 3, line 56 to Col. 4, line 11, recognizes that the filters recited in point 2 exist and applies those filters to determine which pixels are defective. Subsequently, at Col. 4, lines 38-46, Granfors et al. applies a simple linear interpolation of values to correct the defective pixel

value. In other words, despite the clear showing that Granfors et al. was aware of the filters of point 2 and was aware that these filters could be applied to x-ray detector images, Granfors et al. did not apply them to correct the defective pixel value. If point 4 of the examiner's argument was accurate, it seems counter-intuitive that Granfors et al. did not apply those filters to correct the defective pixel. Granfors et al.'s use of the linear interpolation as described at Col. 4, lines 38-46 tends to suggest that one of ordinary skill in the art was not motivated to apply the filters of point 2 to correct a defective pixel value of an x-ray image.

This same logic can be applied to U.S. Patent No. 5,617,461 to Schreiner cited by the examiner during the interview to support his position. At Col. 3, lines 25-37 Schreiner teaches using a 31 x 31 kernel to identify which of the pixels of the x-ray detector are defective. Then, at Col. 3, lines 54-56, Schreiner teaches that the value for the defective pixel can be corrected by "a linear interpolation of adjacent image points." Again, the fact that Schreiner recognizes the existence and applicability of larger filters (here a 31 x 31 filter) for identifying a defective pixel and then only applies a linear interpolation of adjacent image points suggests that one of ordinary skill in the art was not motivated to apply the larger filters to correct a value of a defective pixel, and that point 4 is inaccurate

Thus, since Granfors et al. does not teach every element of Claims 37-43 and since one of ordinary skill in the art would not have been motivated to modify Granfors et al as set out in the Office Action, withdrawal of the rejection of Claims 37-43 is respectfully requested.

B. Rejection of Claims 6, 7, 15, 16, 24, 25, 34, and 35 over Granfors et al. in view of Graham et al.

On pages 7-8 of the Office Action, Claims 6, 7, 15, 16, 24, 25, 34, and 35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Granfors et al. (U.S. 5,657,400) in view of Graham et al. (U.S. 5, 821,915).

Claim 6 was rejected on page 7 of the Office Action. Claims 15, 24, and 34 were rejected on page 8 of the Office Action for reasons analogous to those of Claim 6. Specifically, the examiner argues 1) that Granfors et al. teaches every element of Claim 6 except for utilizing at least three highest local gradient elements to provide a correction value to correct the defective pixel, 2) that Graham et al. teaches using at least three highest local

gradients to provide a correction value to correct the defective pixel, and 3) that one of ordinary skill in the art would have been motivated to modify Granfors et al. based on the teaching Graham et al. to increase the accuracy of providing a correction value. Graham et al. does not teaches using at least three highest local gradients to provide a correction value to correct the defective pixel and one of ordinary skill in the art would not have been motivated to modify Granfors et al. based on the teaching Graham et al.

First, Graham et al. does not teach using at least three highest local gradients to provide a correction value to correct the defective pixel. Rather, Graham et al. teaches that gradients are calculated for an image at three angles and that the single angle having the highest gradient value will be selected to be the halftone angle of the image. See Col. 7, lines 39-43. Since Graham et al. does not teach this element of Claim 6 and since the Office Action recognizes that Granfors et al. does not teach this element of Claim 6, and since nothing in the combination of Granfors et al. and Graham et al. would suggest including an element that is not taught by either reference, Granfors et al. in view of Graham et al. fails to teach every element of Claim 6.

Second, one of ordinary skill in the art would not have been motivated to modify Granfors et al. based on the teachings cited in Graham et al. The teaching of Graham et al. relied on by the Office Action is directed to determining a halftone angle of the image. Graham et al. does not teach that the calculation it makes is useful for anything other than determining a halftone angle. Further, Granfors et al. does not teach or suggest that a halftone angle is present or would need to be identified to correct the defective pixel of the x-ray image of Granfors et al. Since the teaching of Graham et al. (determining a halftone angle) is inapplicable to the application of Granfors et al., one of ordinary skill in the art would not have been motivated to modify Granfors et al. in view of Graham et al.

Thus, since the combination of Granfors et al. and Graham et al. does not teach or suggest every limitation of Claim 6 and since one of ordinary skill in the art would not have been motivated to modify Granfors et al. in view of Graham et al., withdrawal of the rejection of Claim 6 is respectfully requested.

Since Claims 15, 24, and 34 were rejected for reasons analogous to Claim 6, withdrawal of the rejections of those claims is respectfully requested as well.

Each of Claims 7, 16, 25, and 35 depend from one of Claims 6, 15, 24, and 34 so withdrawal of the rejection of those claims is respectfully requested for at least the same reasons at the claim from which it depends.

New Claims

Claims 44-75 have been added. Claims 44-75 are believed to be allowable and are supported by the specification as filed. Particularly, Claims 44-72 are supported by the specification at Fig. 3, by the description corresponding to Fig. 3 at page 7, line 3 to page 9, line 12, and by original Claims 5-8.

Conclusion

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

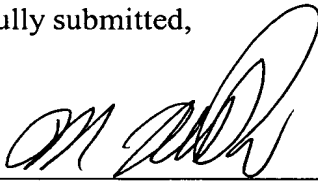
The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 07-0845. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 07-0845. If any extensions of time are needed for timely acceptance of

papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R.
§1.136 and authorizes payment of any such extensions fees to Deposit Account No. 07-0845.

Respectfully submitted,

Date 1/12/04

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